Moment, light load,

$$\Phi=\Phi_0-Px+m=-\frac{t}{l}EI+\frac{2w_0+w_1}{24}l^2-\frac{w_0lx}{2}+\frac{w_0x^2}{2};$$

Moment, heavy load,

$$\Phi'=-\frac{t}{l}EI+\frac{2w_0+w_1}{24}l^2-\frac{w_0+w_1}{2}lx+\frac{w_0+w_1}{2}.x^2. \quad (12)$$

Central moment, light load, $\Phi\left(x=\frac{l}{2}\right)=-\frac{t}{l}EI+\frac{w_1-w_0}{24}l^2;$

Central moment, heavy load, $\Phi'\left(x=\frac{l}{2}\right)=-\frac{t}{l}EI-\frac{w_0+2w_1}{24}l^2. \quad (13)$

Central deflection, light load,

$$y=Tx-Pq+\Phi_0n+F\left(\text{with } x=\frac{l}{2}\right)=\frac{tl}{8}+\frac{w_0-2w_1}{384EI}.l^4;$$

Central deflection, heavy load,

$$y=-T'x-P'q+\Phi_0n+F\left(\text{with } x=-\frac{l}{2}\right)=\frac{tl}{8}+\frac{w_0+3w_1}{384EI}.l^4. \quad (14)$$

Communications received since the end of the Session.

"Researches into the Chemical Constitution of the Opium Bases.—Part IV. On the Action of Chloride of Zinc on Codeia." By Augustus Matthiessen, F.R.S., Lecturer on Chemistry at St. Bartholomew's Hospital, and W. Burnside, of Christ's Hospital. Received June 23, 1870.

On endeavouring to prepare apomorphia by a cheap method, Mr. Mayer and one of us heated morphia with chloride of zinc, to see whether the elements of water could not be abstracted by this reagent (the results of this reaction have not yet been published). Apomorphia having been obtained in this manner, it seemed possible that apocodeia, that is codeia minus the elements of water, might be prepared by a similar reaction. On trying the experiment a new base was obtained, which proved on analysis to be apocodeia.

When hydrochlorate of codeia is heated with an excess of a concentrated solution of chloride of zinc, to a temperature varying between 170° and 180° C., for about 15 minutes, the decomposition takes place; on cooling a yellowish-brown tarry mass separates from the liquid, which on further cooling may be drawn into thin threads, and thus obtained almost free from the excess of the chloride of zinc. This amorphous silk-like mass is almost pure hydrochlorate of apocodeia. To obtain the base in a pure state from this substance, the following method was employed:—

The hydrochlorate was dissolved in hot water and precipitated by hy-

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drochloric acid. The liquid containing the precipitated hydrochlorate was allowed to cool, and the precipitate on solidifying was separated from the acid solution. The operation of dissolving and reprecipitating with hydrochloric acid was repeated several times, and lastly the hydrochlorate was dissolved in water, precipitated with carbonate of sodium, and the base extracted with ether. On evaporating the ether-solution the base remained behind as an amorphous, gum-like, reddish mass; this was powdered, dried in a water-bath, and gave on analysis the following results. All combustions were made with oxide of copper and oxygen.

(I.) 0·3245 gramme of the base, dried at 100° C., gave 0·9150 carbonic acid and 0·2080 water.

(II.) 0·3150 gramme of the base gave 0·8860 carbonic acid and 0·1960 water.

(III.) 0·4570 gramme of the base, burnt with soda-lime, gave 0·1600 metallic platinum.

			Found.		
		Calculated.	(I.)	(II.)	(III.)
C_{18}	216	76·87	76·89	76·70	
H_{19}	9	6·76	7·12	6·91	
N	14	4·98			4·97
O_2	32	11·39			
	281	100·00			

The reaction that has therefore taken place is similar to that of hydrochloric acid on morphia, viz. that the chloride of zinc has abstracted the elements of water, thus:—

Morphia. Apomorphia.
$$C_{17}H_{19}NO_3 = H_2O + C_{17}H_{17}NO_2.$$

Codeia. Apocodeia.
$$C_{18}H_{21}NO_3 = H_2O + C_{18}H_{19}NO_2.$$

The base itself is soluble in alcohol, ether, and chloroform, but almost insoluble in water, and has not yet been obtained in the crystalline state.

The hydrochlorate, obtained by shaking the ether-solution of the pure base with hydrochloric acid, and evaporating the acid solution to dryness, gave the following on analysis:—

0·563 gramme of the hydrochlorate gave 0·256 chloride of silver.

		Calculated.	Found.
$C_{18}H_{20}NO_2$	282	88·82	
Cl	35·5	11·18	11·25
	317·5	100·00	

The hydrochlorate cannot be obtained in a crystalline state; it is easily soluble in water, and is precipitated thence by strong hydrochloric acid.

On comparing the actions of different reagents on this base with those obtained with apomorphia (Proc. Roy. Soc. No. 112, 1869, p. 459), they

were found to be almost identical, the most marked of the few differences being that the blood-red colour given with nitric acid is much more permanent than in the similar apomorphia reaction. Between the two bases also a very marked difference exists in respect of stability, apocodeia being far superior in this respect to apomorphia; in fact it may be precipitated by ammonia or carbonate of sodium, washed and dried, without undergoing a marked change of colour.

The hydrochlorates also differ; for that of apomorphia can be easily crystallized, whereas hydrochlorate of apocodeia has only been obtained in an amorphous state. The preparation of apocodeia is easy and sure, yielding a very large product. In this respect it differs materially from apomorphia, the preparation of which is tedious, and the amount of yield very uncertain, hence the high price of this valuable therapeutical agent. The solutions of the two hydrochlorates also show the same differences that the bases themselves do. In physiological effects also there is a decided difference between the hydrochlorates, that of apomorphia being, as observed by Dr. Gee, a very violent emetic, whilst that of apocodeia is, according to Dr. Legg's experiments, a mild emetic; it also produces subcutaneous abscesses at the place of injection, which the apomorphia salt does not.

It has been shown in Part II. (Proc. Roy. Soc. vol. xvii. p. 460) of these researches, that when codeia is heated with hydrochloric acid it splits up into chloride of methyl, water, and apomorphia. The action of hydriodic acid on narcotine for the elimination of the methyl contained in it is, however, more energetic than that of hydrochloric acid. Therefore it was thought probable that, by means of hydriodic acid, CH_2 might be abstracted alone, as iodide of methyl, from the codeia, leaving the elements of water, and thus forming morphia.

On trying the experiment, however, not a trace of iodide of methyl was obtained, but the iodide of a new base, which is at present under examination.

The codeia with which the foregoing experiments were made was kindly presented to us by Messrs. M^{c}Farlan and Co., of Edinburgh, to whose liberality we are already so much indebted.

"Experiments on the Action of Red Bordeaux Wine (Claret) on the Human Body." By E. A. Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School, and Count Cyprian Wollowicz, M.D., Assistant Surgeon, Army Medical Staff. Received July 5, 1870.

In the Proceedings of the Royal Society (No. 120) is an account of some experiments with pure alcohol and brandy on a healthy man. This paper is intended as a continuation, with the substitution in the experiments of red Bordeaux wine (claret) for alcohol and brandy. The same